HEWLETT-PACKARD

HP 4951C, HP 4952A, and HP 4954A
Protocol Analyzer

Data Communications Test Library

User's Guide

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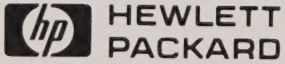
HP 4951C, HP 4952A and HP 4954A Protocol Analyzers

Data Communications Test Library

Users Guide



Manual Part Number: 5959-2325
Microfiche Part Number: 5959-2326

Printed in U.S.A. September 1987

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Product Introduction 1

Introduction

This package of tests is intended to help you easily apply the power of Hewlett-Packard's protocol analyzers in the solution of common data communications problems. They also provide examples and starting points for you to develop custom tests. The Data Communications Test Library programs are written entirely in HP 4951C Monitor or Simulate menus. They work with the HP 4951C, HP 4952A, and HP 4954A in Asynchronous, Synchronous, SDLC/HDLC, X.25, and other environments.

This section presents a list of the programs with brief descriptions, grouped by application. A more detailed description of each program with instructions for use and program results is in the final section (Section 3) of this manual. Instructions for copying the master disc (highly recommended), loading, storing, modifying, and printing programs are in Section 2.

Looking Up a Program

All programs in this collection use the file name format defined here to aid in locating a desired program on a disc. The first letter of the file name indicates the program application as listed in the following table.

A	General purpose asynchronous monitor programs
B	General purpose asynchronous simulate programs
C	Async terminal tests
D	Async printer tests
E	Test devices sending to async printers
F	Test Async devices across a modem link
I	Interface tests (level 1)
S	SDLC tests
U	Instrument setups
X	X.25 tests

All tests are stored on disc with a comment field that briefly describes the test.

Using a Program

Instructions for loading programs are presented in the next section if you are not yet familiar with your HP Protocol Analyzer. Hewlett-Packard recommends that you make a working copy (also covered in Section 2) of your master disc and store the master disc in a safe place. Since all programs in the Data Communications Test Library are standard menus, they can be infinitely copied and easily modified for your particular needs. Note that any "Load Menus" or "Store Menus" operation involves Monitor, Simulate, Setup and Run Menus.

Data Communications Configuration (Protocol Analyzer Setup)

For consistency and simplicity all programs in this library are stored with a common set of data communications parameters which are loaded into the analyzer when you load the program. These parameters may be easily changed in the Setup Menu to suit your system. Refer to the Operating Manual for your Hewlett-Packard protocol analyzer for guidance.

NOTE

Changing some parameters such as Code, Mode, or Character Framing, may require corresponding changes to the monitor or simulate menus. Programs modified to take advantage of unique HP 4952A program features may not run on the HP 4951C or HP 4954A.

The parameters loaded with the library programs include:

9600 bps line speed
ASCII-7, Odd parity for Async
EBCDIC, DCE supplies DTE clock for SDLC
ASCII-8, DCE supplies DTE clock for X.25/HDLC

Data Communications Test Library Program List

Program Name	Program Application
	General purpose async monitor
A_COUNTCHR	Count DTE and DCE characters for 1 Min
A_COUNTPAR	Count DTE and DCE parity errors for 1 Min
	General purpose async simulate
B_ASC7EVER	Send ASCII7 even parity errored string
B_ASC7ODER	Send ASCII7 odd parity errored string
B_AUTOBAUD	Find device's bit rate
B_BRBRPOLE	Send 81 char with Xon/off and DTR - Continuous
B_BRBRPOLS	Send 81 char with Xon/off and DTR - 4 Pages
B_FOXFLOW	Send QBFox with Xon/off and DTR - Continuous
	Async terminal tests
C_ALGNMNT	Send "crosshair in square" pattern for alignment
C_RESPTIME	Measure avg & instant response time CR - prompt
	Async printer tests
D_BUFFER	Determine printer's buffer characteristics
D_DTR	Exercise printer with DTR flow control
D_XONXOFF	Exercise printer with Xon-Xoff flow control
	Test devices sending to async printers
E_DTRFLOW	Exercise device sending to printer - DTR
E_XONXOFF	Exercise device sending to printer - Xon/off

Test async devices accross a modem link

F_BRBRPOLS	Send 4 pgs 81 char with Xon/off & CTS modem link
F_BUFFER	Determine printer's buffer character modem link

Interface tests

I_AVRTSCTS	Measure average RTS-CTS time - 10 intervals
I_AVTURND	Average remote turnaround time - RTS-CD
I_CDOFF	Checks for CD off while recieving data
I_CD_TO_RD	CD on to recieved data
I_CD_TO_TD	CD off to transmitted data
I_CTSTD	CTS on to transmitted data
I_CTS_ERR	Checks for CTS off before RTS off
I_DSR_DTR	Detect transitions and glitches on DSR & DTR
I_LCLTURND	Local turnaround time CD off to RTS on
I_RMT_TRND	RTS off to CD on
I_RTS_CTS	RTS on to CTS on
I_RTS_ERR	RTS off while transmitting data
I_RTS_TD	RTS on to transmit data

SDLC tests

S_CNTERRS	Count DTE & DCE aborts & FCS errors - 60 Min
S_CNTIVALL	Count DTE & DCE I frames vs total frames 60 Min
S_CTSTPRDC	Count DCE XIDs, SNRMs / DTE IDs, UAs - 60 Min
S_CTSTPRDT	Count DTE XIDs, SNRMs / DCE IDs, UAs - 60 Min
S_HILITFLG	Highlight flags on line
S_SNRM	Set leads on, send SNRM, beep on other than UA
S_UTIL	Measure half duplex BOP line utilization - 10 Min

Instrument setups

U_BURS_SPS	Setup for Sync Burroughs Poll/Select
U_BUR_A_PS	Setup for Async Burroughs Poll/Select
U_IPARS	Setup for common IPARS system
U_SYALL7	Setup to capture all bits on 7 bit sync link
U_SYALL8	Setup to capture all bits on 8 bit sync link
U_UNISCOPE	Setup for Uniscope sync link

X.25 tests

X_CALLTRYS	Count link attempts and anomalous response
X_CNTALLFR	Count DTE + DCE SABM, UA, DISC, FRMR, RNR
X_CNTCALLS	Count DTE & DCE CALLs & CALL ACCEPTs - 1 Hr
X_CNTCONCT	Count DTE and DCE SABMs and UAs - 60 Min
X_CNTDCEFR	Count DCE SABM, UA, DISC, FRMR, RNR
X_CNTDCFRT	Count DCE SABM, UA, DISC, FRMR - 60 Min
X_CNTDTEFR	Count DTE SABM, UA, DISC, FRMR, RNR
X_CNTDTFRT	Count DTE SABM, UA, DISC, FRMR - 60 Min
X_CNTERRS	Count DCE and DTE Aborts and FCS errors - 60 Min
X_CNTIVALL	Count DCE and DTE I frames vs total frames - 10 Min
X_DCEUTIL	DCE utilization - 10 Min
X_DTEUTIL	DTE utilization - 10 Min
X_HILITFLG	Highlight flags
X_LINKUPDN	Bring link up, then down, highlight errors
X_LVL1	Detect control lead and interface problems

Installing Programs 2

Loading a Program from Disc

1. Insert the Data Communications Test Library or your Customized Test Library disc (described on next page) into the disc drive.

2. Press [MORE], then <Mass Store> to display the disc directory.

3. Use the arrow keys to select and highlight the program of your choice. A description of each test is included in the next Section.

4. Press <Load>, then <Execute>. The program you chose is loaded. Press [Exit] to return to top level. Press <Setup> to check or modify datacom link parameters. If you loaded a Monitor Program, press <Mon Menu> to view or modify it. If you loaded a Simulate Program, press <Sim Menu> to view or modify it.

5. To execute the program, at the top menu level, press <Run Menu>, then <Monitor> or <Simulate> depending on which type of test you loaded.

Copying the Master Disc

The master disc contains the Data Communications Test Library of programs. You must use the basic loading and storing features of the protocol analyzer to copy the programs to a work disc. If you have access to an HP 4952A Protocol Analyzer, and wish to copy the entire disc, you may use the "Copy Disc" utility supplied with the HP 4952A.

Hewlett-Packard recommends you copy the programs that you will use from the master disc to a work disc. This disc will be called your customized test library. New discs must be formatted before they can be stored to.

Creating Your Customized Test Library

1. Insert your master disc containing the sample programs into the disc drive.

2. At the top level menu, press [MORE] and <Mass Store>. The disc is read and the directory of files on the disc is displayed.

3. Use the arrow keys to locate and highlight the first program you wish to load.

NOTE

The order in which you load the programs from the master to your customized test library disc will be the order in which they will appear on your disc.

---

4. Press <Load> and <Execute>. The program is now in memory in the protocol analyzer. Datacom link parameters should be checked in the <Setup> menu and modified as needed.

5. If you wish to view or modify the program, follow steps a - d. Otherwise, go to step 6.

   a. Press [EXIT].

   b. Press <Mon Menu> or <Sim Menu> (depending on which type of program you have loaded). Make any changes required for your particular application to the program.

   c. Press [EXIT].

   d. From the top level level menu, press [MORE], then <Mass Store>.

NOTE

Changing some parameters such as Code, Mode, or Character Framing, may require corresponding changes to the monitor or simulate menus. Programs modified to take advantage of unique HP 4952A features may not run on the HP 4951C.

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6. Press <Store>. Move the cursor to the File Name line and enter the name you wish to call this program. You may use the given default name if you wish. Make sure the File Type is Menus.

7. Remove the master disc and insert your customized test library disc into the disc drive.

8. Press <Execute>. When the disc activity stops, the Mass Store menu returns.

Repeat steps 1 - 8 above until you have loaded all the programs you will need on your customized test library disc.

Printing a Program

You may print program listings to help modify or understand a program. Do the following to output a monitor (simulate) program listing to a printer.

Print set up - HP 4951C

1. Load the Print Application Program.

   a. From the top level menu, press [MORE], then <Mass Store>.

   b. Press [MORE], then <Print Appl>, then <Execute>.

2. Configure the Print Application Program.

   a. From the top level menu, press [MORE], then <Print>.

   b. Define the printer parameters.

Printing a Monitor (Simulate) Program - HP 4951C

1. From the top level menu, press [More], then <Print>.

2. Select <Monitor> (<Simulate>), press <Execute>.

Print set up - HP 4952A

1. From the top level menu press [MORE], then <Remote & Print>.
2. Press <Print Setup> and define the printer parameters.
3. Press the <Save Cnfg> key to save your printer configuration.
4. Press [EXIT] twice to return to the main level menu.

Printing a Monitor (Simulate) Program - HP 4952A

1. Load the program into the protocol analyzer.
2. Press the <Mon Menu> (<Sim Menu>) key.
3. Press [MORE] three times, then <Print Prog> to print the program to the printer.

Data Communications Test Library Program Descriptions

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Looking Up a Program

All programs in this collection use the file name format defined here to aid in locating a desired program on a disc. The first letter of the file name indicates the program application as listed in the following table.

Note that program names appear in the upper right hand corner on the following program description pages.

A	General purpose asynchronous monitor programs
B	General purpose asynchronous simulate programs
C	Async terminal tests
D	Async printer tests
E	Test devices sending to async printers
F	Test Async devices across a modem link
I	Interface tests (level 1)
S	SDLC tests
U	Instrument setups
X	X.25 tests

REVISION: (06-25-87) PROGRAM NAME: A_COUNTCHR

PROGRAM PURPOSE: Count DCE and DTE characters for 1 minute (or 10 minutes). Useful for checking link throughput, file sizes, etc.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, parity, etc.
2. "Don't Care" characters in Block 2 can be replaced by any desired character string.
3. "Stop Tests" in Block 9 can be removed for 10 minute operation with minutes counted in counter 1.
4. The first counter 1 test value in block 9 can be replaced by any desired (minutes - 1) value for different test duration.

Note that high line utilitization above 9600 bps may cause the analyzer's buffer to overflow, returning the instrument to top level.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE characters x 1
Counter 3: DTE characters / 1000
Counter 4: DCE characters x 1
Counter 5: DCE characters / 1000

Timer 1: Milliseconds of test

DTE chars/minute = (Counter 3 x 1000) + Counter 2
DCE chars/minute = (Counter 5 x 1000) + Counter 4

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: A_COUNTPAR

PROGRAM PURPOSE: Count DCE and DTE parity errors for 60 seconds (or 10 minutes). Parity errors indicate a link problem.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, parity, etc.
2. "Stop Tests" in Block 9 can be removed for 10 minute operation with minutes counted in counter 1.
3. The first counter 1 test value in block 9 can be replaced by any desired (minutes - 1) value for other test durations.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE parity errors x 1
Counter 3: DTE parity errors / 1000
Counter 4: DCE parity errors x 1
Counter 5: DCE parity errors / 1000

Timer 1: Milliseconds of test

DTE parity errors/minute = (Counter 3 x 1000) + Counter 2
DCE parity errors/minute = (Counter 5 x 1000) + Counter 4

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: B_ASC7EVER

PROGRAM PURPOSE: Continuously send ASCII 7 even parity string in which all "R"s have errored parity. Useful for testing device response to parity errors.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate.
2. Test sends as DCE, can be changed in Simulate Menu to DTE.

RESULTS:

All transmitted "R"s have parity errors.

REVISION: (06-25-87) PROGRAM NAME: B_ASC7ODER

PROGRAM PURPOSE: Continuously send ASCII 7 odd parity string in which all "R"s have errored parity. Useful for testing device response to parity errors.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate.
2. Test sends as DCE, can be changed in Simulate Menu to DTE.

RESULTS:

All transmitted "R"s have parity errors.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: B_AUTOBAUD

PROGRAM PURPOSE: Send string such that terminal or printer's configured bit rate will appear on tested device. Useful for determining async device speed. Identifies 1200, 2400, 9600, 19200 devices.

OPERATING INSTRUCTIONS: Run Simulate
Test sends as DCE, can be changed in Simulate Menu to DTE.

RESULTS:
Bit rate of tested device will appear on device.

Note that this test was written for 8 bit ASCII and may not work with 7 bit ASCII data codes.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: B_BRBRPOLE

PROGRAM PURPOSE: Continuously send 81 character string with both Xon/Xoff and DTR flow control. Useful for exercising terminals, printers and other devices, lost or errored characters are easily detected visually.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE, can be changed in Simulate Menu to DTE.

Note that this program sends no carriage-return/line-feed and assumes that continuous character strings will be automatically "wrapped" at the end of each line by the device under test.

RESULTS:

81 character "stairstep" pattern appears on printer or terminal. This pattern is very visually distinctive, so that errored or lost characters can be visually detected.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: B_BRBRPOLS

PROGRAM PURPOSE: Send about 4 pages of an 81 character string with both Xon/Xoff and DTR flow control. Useful for exercising terminals, printers and other devices, lost or errored characters are easily detected visually.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE, can be changed in Simulate Menu to DTE.

Note that this program sends no carriage-return/line-feed and assumes that continuous character strings will be automatically "wrapped" at the end of each line by the device under test.

RESULTS:

81 character "stairstep" pattern appears on printer or terminal. This pattern is very visually distinctive, so that errored or lost characters can be visually detected.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: B_FOXFLOW

PROGRAM PURPOSE: Send QUICK BROWN FOX message with Xon/Xoff and DTR flow control continuously. Useful for exercising terminals, printers and other devices, lost or errored characters are easily detected visually.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE, can be changed in Simulate Menu to DTE.

RESULTS:

QUICK BROWN FOX message sent to terminal or printer. This pattern is very visually distinctive, so that errored or lost characters can be visually detected.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: C_ALGNMNT

PROGRAM PURPOSE: Send "cross-hair in square" pattern for terminal display alignment.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE, can be changed in Simulate Menu to DTE.

RESULTS:

"Cross-hair in square" pattern on terminal display.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: C_RESPTIME

PROGRAM PURPOSE: Measure average and instantaneous response time from DTE carriage-return to DCE prompt. Response time is a key indicator of system loading problems or link errors, and a major contributer to user dissatisfaction.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test assumes Terminal is DTE, Host is DCE, carriage-return from Terminal gets carriage-return or line-feed then any prompt character from Host.
3. Press Return on Terminal as many times as desired.

RESULTS:

Counter 1: Number of responses
Counter 2: Minutes total resp time

Timer 1: Last response time
Timer 2: msec total response time

$$\text{Average response time is } \frac{(\text{Counter 2 minutes} + \text{Timer 2 msec})}{\text{Counter 1}}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: D_BUFFER

PROGRAM PURPOSE: Determine printer buffer characteristics.

PROGRAM DESCRIPTION: Send Xs until Xoff or DTR off, then 60 character string to visually determine printer buffer after Xoff or DTR off. Incompatibilities between printer buffer and sending device flow control response can cause lost characters on printouts.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE, can be changed in Simulate Menu to DTE.

Note that this program sends no carriage-return/line-feed and assumes that continuous character strings will be automatically "wrapped" at the end of each line by the device under test.

RESULTS:

Counter 1: Characters before first flow off
Counter 2: Characters between flow on/off
Counter 3: Number of flow off/on cycles

Printer will print X until it sends a flow off (Xoff or DTR off), then 123456789A123456789B123456789C123456789D123456789E123456789 is sent to printer. Number of characters of this string that are printed indicates printer's buffer size after flow off.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: D_DTR

PROGRAM PURPOSE: Exercise a printer with DTR flow control. Program sends 78 character lines of X with carriage return/line feed at end of each line. See also General Purpose async simulate programs.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE, can be changed in Simulate Menu to DTE.

RESULTS:

Continuous display of 78 character lines of X.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: D_XONXOFF

PROGRAM PURPOSE: Exercise a printer with Xon/Xoff flow control. Program sends 78 character lines of X with carriage return/line feed at end of each line. See also General Purpose async simulate programs.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DCE, can be changed in Simulate Menu to DTE.

RESULTS:

Continuous display of 78 character lines of X.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: E_DTRFLOW

PROGRAM PURPOSE: Test devices sending to printers with DTR control.
Find how many characters device sends after DTR off.
Incompatibilities between printer buffer and sending device flow control response can cause lost characters on printouts.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DTE, can be changed in Simulate Menu to DCE.
3. Send large file from host as if printing.

RESULTS:

Counter 2: Number of DTR cycles
Counter 3: Total chars sent w/DTR off

$$\text{Average characters sent with DTR off is } \frac{\text{Counter 3}}{\text{Counter 2}}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: E_XONXOFF

PROGRAM PURPOSE: Test devices sending to printers with XON/XOFF control. Find how many characters device sends after Xoff. Incompatiblities between printer buffer and sending device flow control response can cause lost characters on printouts.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DTE, can be changed in Simulate Menu to DCE.
3. Send large file from host as if printing.

RESULTS:

Counter 2: Number of Xon/Xoff cycles.
Counter 3: Total chars sent after Xoff.

$$\text{Average characters sent after Xoff is } \frac{\text{Counter 3}}{\text{Counter 2}}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: F_BRBRPOLS

PROGRAM PURPOSE: Send 81 character string with both Xon/Xoff and CTS flow control, about 4 pages. Useful for testing printers or other devices accross modem links. Lost or errored characters are easily detected visually.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DTE.
3. Test expects DSR, CD, and CTS to be high, beeps if low.
4. Terminal emulator can be used to dial link.

Note that this program sends no carriage-return/line-feed and assumes that continuous character strings will be automatically "wrapped" at the end of each line by the device under test.

RESULTS:

81 character "stairstep" pattern appears on printer or terminal at other end of modem link.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: F_BUFFER

PROGRAM PURPOSE: Determine printer buffer characteristics accross modem link. Incompatiblities between printer buffer and sending device flow control response can cause lost characters on printouts.

PROGRAM DESCRIPTION: Send Xs until Xoff or CTS off, then 60 character string to visually determine printer buffer after Xoff or CTS off.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, parity, etc.
2. Test sends as DTE, can be changed in Simulate Menu to DCE.
3. Test expects DSR, CD, and CTS high, will beep if they are not.
4. Test raises DTR, RTS
5. Link can be dialed using Terminal emulator.

Note that this program sends no carriage-return/line-feed and assumes that continuous character strings will be automatically "wrapped" at the end of each line by the device under test.

RESULTS:

Counter 1: Chars before first flow off
Counter 2: Chars between flow on/off
Counter 3: Number of flow off/on cycles

Printer will print X until it sends a flow off (Xoff or DTR off), then 123456789A123456789B123456789C123456789D123456789E123456789 is sent to printer. Number of characters of this string that are printed indicates printer's buffer size after flow off.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: 1_AVRTSCTS

PROGRAM PURPOSE: Measure average RTS-CTS time for 10 intervals. On half duplex systems RTS-CTS delay is one major factor in link efficiency. Longer reduces throughput, shorter increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Counter 1: Number of RTS-CTS periods

Timer 1: Total RTS-CTS time

$$\text{Average RTS-CTS time is } \frac{\text{Timer 1}}{10}$$

Transitions are highlighted in the data and state display.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: I_AVTURND

PROGRAM PURPOSE: Measure average remote turnaround time (RTS off to CD on) on half duplex link for 5 turnarounds. Link efficiency is highly effected by turnaround time. Longer decreases throughput, shorter increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Counter 1: Number of turnarounds

Timer 1: Total turnaround time

$$\text{Average turnaround time is } \frac{\text{Timer 1}}{5}$$

Transitions are highlighted in the data and state display.

REVISION: (06-25-87) PROGRAM NAME: 1_CDOFF

PROGRAM PURPOSE: Checks if CD is off while data is being recieved.
In most systems, CD should be on when recieving data.

OPERATING INSTRUCTIONS: Run Monitor
1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:
Counter 1: Number of characters with CD off

Characters recieved with CD off are highlighted.

REVISION: (06-25-87) PROGRAM NAME: 1_CD_TO_RD

PROGRAM PURPOSE: Measures time from CD on to recieved data on half duplex system. Longer delay reduces throughput, shorter increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Timer 1: CD on to recieved data time

Lead transition and first recieved character are highlighted.

REVISION: (06-25-87) PROGRAM NAME: 1_CD_TO_TD

PROGRAM PURPOSE: Measures time from CD off to transmitted data on half duplex system. Longer reduces throughput, shorter increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Timer 1: CD off to transmitted data time

Lead transition and first recieved character are highlighted.

REVISION: (06-25-87) PROGRAM NAME: 1_CTSTD

PROGRAM PURPOSE: Measures time from CTS on to transmitted data on half duplex system. Longer reduces throughput, shorter increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Timer 1: CTS on to transmitted data time

Lead transition and first transmitted character are highlighted.

REVISION: (06-25-87) PROGRAM NAME: I_CTS_ERR

PROGRAM PURPOSE: Detect CTS drop before RTS. Indicates link or modem problem.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Counter 1: Number of illegal transitions

Illegal lead transitions are highlighted.

REVISION: (06-25-87) PROGRAM NAME: 1_DSR_DTR

PROGRAM PURPOSE: Detect transitions and glitches on DSR and DTR.
In modem link, these leads should generally stay on.

OPERATING INSTRUCTIONS: Run Monitor
1. Check Setup Menu for proper bit rate, parity, etc.

Detects on to off transitions.

RESULTS:
Counter 1: DTR transitions
Counter 2: DSR transitions

REVISION: (06-25-87) PROGRAM NAME: I_LCLTURND

PROGRAM PURPOSE: Measures local turn-around (CD off to RTS on) on half duplex system. Longer reduces throughput, shorter increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Timer 1: Turnaround time

Lead transitions are highlighted.

REVISION: (06-25-87) PROGRAM NAME: I_RMT_TRND

PROGRAM PURPOSE: Measures time from RTS off to CD on in half duplex system and number of polls before a response. Longer reduces throughput, shorter increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Counter 1: Number of polls

Timer 1: First RTS off to CD on
Timer 2: Last poll RTS off to CD on

Lead transitions are highlighted.
If there is only one poll, time measurement is in Timer 1.

REVISION: (06-25-87) PROGRAM NAME: I_RTS_CTS

PROGRAM PURPOSE: Measures time from RTS on to CTS on half duplex system and number of polls before a response. Longer reduces throughput, shorter increases error probability.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Timer 1: First RTS on to CTS on

Lead transitions are highlighted.

REVISION: (06-25-87) PROGRAM NAME: 1_RTS_ERR

PROGRAM PURPOSE: Detect RTS off while transmitting data. RTS off while DTE is transmitting indicates DTE problem.

OPERATING INSTRUCTIONS: Run Monitor

1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:

Counter 1: Number of characters with RTS off

Characters with RTS off are highlighted.

REVISION: (06-25-87) PROGRAM NAME: I_RTS_TD

PROGRAM PURPOSE: Measures time from RTS on to transmitted data.
Longer reduces throughput, shorter increases error probability.

OPERATING INSTRUCTIONS: Run Monitor
1. Check Setup Menu for proper bit rate, parity, etc.

RESULTS:
Timer 1: Time from RTS on to transmitted data

Lead transitions and characters are highlighted.

REVISION: (06-25-87) PROGRAM NAME: S_CNTERRS

PROGRAM PURPOSE: Count DCE and DTE Aborts and FCS errors for 60 minutes. Aborts may indicate DTE problems, FCS errors indicate link problems.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 60 minutes (D-1=59) in the first Counter 1 test line of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE Aborts
Counter 3: DCE Aborts
Counter 4: DTE FCS errors
Counter 5: DCE FCS errors

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: S_CNTIVALL

PROGRAM PURPOSE: Count DCE/DTE I frames vs total framesfor 60 minutes. System throughput increases with the number of I frames per total frames.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 60 minutes (D-1=59) in the first Counter 1 test line of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE all frames
Counter 3: DTE I-frames
Counter 4: DCE all frames
Counter 5: DCE I-frames

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: S_CTSTPRDC

PROGRAM PURPOSE: Count DCE XIDs, SNRMs / DTE IDs, UAs for 60 minutes. XIDs should equal IDs and be a low number. There should be fewer SNRMs than UAs, and not many of either. This test assumes primary (host) is DCE.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 60 minutes (D-1=59) in the first Counter 1 test line of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DCE XIDs
Counter 3: DTE XIDs
Counter 4: DCE SNRMs
Counter 5: DTE UAs

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: S_CTSTPRDT

PROGRAM PURPOSE: Count DTE XIDs, SNRMs / DCE IDs, UAs for 60 min.
XIDs should equal IDs and be a low number. There should be fewer SNRMs than UAs, and not many of either.
This test assumes primary (host) is DTE.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 60 minutes (D-1=59) in first line of Block 2.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE XIDs
Counter 3: DCE XIDs
Counter 4: DTE SNRMs
Counter 5: DCE UAs

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: S_HILITFLG

PROGRAM PURPOSE: Highlight and capture/display only flags on line.
Absence of flags indicates inactive device.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)
1. Check Setup Menu for proper bit rate, clock sources, etc.

RESULTS:
Flags (hex 7E) are highlighted in buffer.
Only flags are captured or displayed.

REVISION: (06-25-87) PROGRAM NAME: S_SNRM

PROGRAM PURPOSE: Set leads on, send SNRM, beep on reciept of other than UA indicating error on part of secondary.
This test acts as primary (host) as DCE.

OPERATING INSTRUCTIONS: Run Simulate

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Timeout of 3000 ms can be changed in Timer 1 test in block 1.

RESULTS:

Beep on timeout (3000 ms) or response other than UA.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: S_UTIL

PROGRAM PURPOSE: Measure half duplex Bit Oriented Protocol line utilization for 10 minutes.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 10 minutes (D-1=9) in first counter limit of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE utilized minutes
Counter 3: DCE utilized minutes

Timer 1: mSec of test
Timer 2: mSec utilized DTE
Timer 3: mSec utilized DCE

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: U_BURS_SPS

PROGRAM PURPOSE: Setup for synchronous Burroughs Poll/Select link.

REVISION: (06-25-87) PROGRAM NAME: U_BUR_A_PS

PROGRAM PURPOSE: Setup for asynchronous Burroughs Poll/Select link.

REVISION: (06-25-87) PROGRAM NAME: U_IPARS

PROGRAM PURPOSE: Setup for common IPARS system.

PROGRAM PURPOSE: Setup to capture all bits on 7 bit framed synchronous link. Useful for preliminary analysis of unknown or disfunctional protocol. To maximize buffer utilization, Hewlett-Packard Protocol Analyzers do not store some data, i.e. bits between frames in bit oriented setups.

REVISION: (06-25-87) PROGRAM NAME: U_SYALL8

PROGRAM PURPOSE: Setup to capture all bits on 8 bit framed synchronous link. Useful for preliminary analysis of unknown or disfunctional protocol. To maximize buffer utilization, Hewlett-Packard Protocol Analyzers do not store some data, i.e. bits between frames in bit oriented setups.

REVISION: (06-25-87) PROGRAM NAME: U_UNISCOPE

PROGRAM PURPOSE: Setup for Uniscope synchronous link.

REVISION: (06-25-87) PROGRAM NAME: X_CALLTRYS

PROGRAM PURPOSE: Detect and count link attempts and anomalous responses. Anomalous response to SABM includes non-UA and non-SABM frames from either side and timeouts. Anomalous responses are highlighted.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 60 minutes (D-1=59) in first counter limit of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE link attempts (SABMs)
Counter 3: Anomalous response to DTE
Counter 4: DCE link attempts (SABMS)
Counter 5: Anomalous response to DCE

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: X_CNTALLFR

PROGRAM PURPOSE: Count DTE plus DCE SABM, UA, DISC, FRMR and RNR
In general, all these numbers should be low.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. This test must be stopped manually [HALT/EXIT].

RESULTS:

Counter 1: DCE + DTE SABMs
Counter 2: DCE + DTE UAs
Counter 3: DCE + DTE DISCs
Counter 4: DCE + DTE FRMRs
Counter 5: DCE + DTE RNRs

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: X_CNTCALLS

PROGRAM PURPOSE: Count DTE and DCE CALLs and CALL ACCEPTs for 60 minutes. Difference in number of CALLs and CALL ACCEPTs on either side indicates unsuccessful CALLs.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 60 minutes (D-1=59) in first counter limit of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE CALLs
Counter 3: DCE CALL ACCEPTs
Counter 4: DCE CALLs
Counter 5: DTE CALL ACCEPTs

Timer 1: mSec of test

In general on an X.25 link, counter 2 should be close to counter 3 and counter 4 to counter 5.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: X_CNTCONCT

PROGRAM PURPOSE: Count DTE and DCE SABMs and UAs for 60 minutes. Number of SABMs and UAs should be close for and low for each side.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 60 minutes (D-1=59) in first counter limit of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE SABMs
Counter 3: DCE UAs
Counter 4: DCE SABMS
Counter 5: DTE UAs

Timer 1: mSec of test

In general on an HDLC (X.25) link, counter 2 should be close to counter 3 and counter 4 to counter 5.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: X_CNTDCEFR

PROGRAM PURPOSE: Count DCE SABM, UA, DISC, FRMR and RNR
In general, all should be fairly low numbers.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. This test must be stopped manually [HALT/EXIT].

RESULTS:

Counter 1: DCE SABMs
Counter 2: DCE UAs
Counter 3: DCE DISCs
Counter 4: DCE FRMRs
Counter 5: DCE RNRs

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: X_CNTDCFRT

PROGRAM PURPOSE: Count DCE SABM, UA, DISC, FRMR for 60 minutes
In general, all should be fairly low numbers.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 60 minutes (D-1=59) in first counter limit of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DCE SABMs
Counter 3: DCE UAs
Counter 4: DCE DISCs
Counter 5: DCE FRMRs

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: X_CNTDTEFR

PROGRAM PURPOSE: Count DTE SABM, UA, DISC, FRMR and RNR
In general, all should be fairly low numbers.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. This test must be stopped manually [HALT/EXIT].

RESULTS:

Counter 1: DTE SABMs
Counter 2: DTE UAs
Counter 3: DTE DISCs
Counter 4: DTE FRMRs
Counter 5: DTE RNRs

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: X_CNTDTFRT

PROGRAM PURPOSE: Count DTE SABM, UA, DISC, FRMR for 60 minutes
In general, all should be fairly low numbers.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 60 minutes (D-1=59) in first counter limit of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE SABMs
Counter 3: DTE UAs
Counter 4: DTE DISCs
Counter 5: DTE FRMRs

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: X_CNTERRS

PROGRAM PURPOSE: Count DCE and DTE Aborts and FCS errors for 60 minutes. Aborts may indicate DTE problems, FCS errors indicate link problems.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 60 minutes (D-1=59) in first counter limit of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE Aborts
Counter 3: DCE Aborts
Counter 4: DTE FCS errors
Counter 5: DCE FCS errors

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: X_CNTIVALL

PROGRAM PURPOSE: Count DCE/DTE I frames vs total frames. System throughput increases with number of I frames per total frames.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 60 minutes (D-1=59) in first counter limit of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE all frames
Counter 3: DTE I-frames
Counter 4: DCE all frames
Counter 5: DCE I-frames

Timer 1: mSec of test

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: X_DCEUTIL

PROGRAM PURPOSE: Measure full duplex DCE side Bit Oriented Protocol line utilization for 10 minutes.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 10 minutes (D-1=9) in first counter limit of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DCE utilized minutes

Timer 1: mSec of test
Timer 2: mSec utilized DCE

$$\text{DCE utilization is } \frac{\text{Counter 2 minutes + Timer 2 mSec}}{\text{Counter 1 minutes + Timer 1 mSec}}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: X_DTEUTIL

PROGRAM PURPOSE: Measure full duplex DTE side Bit Oriented Protocol line utilization for 10 minutes.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.
2. Test duration can be changed from 10 minutes (D-1=9) in first counter limit of Block 3.

RESULTS:

Counter 1: Minutes of test
Counter 2: DTE utilized minutes

Timer 1: mSec of test
Timer 2: mSec utilized DTE

$$\text{DTE utilization is } \frac{\text{Counter 2 minutes + Timer 2 mSec}}{\text{Counter 1 minutes + Timer 1 mSec}}$$

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87)

PROGRAM NAME: X_HILITFLG

PROGRAM PURPOSE: Highlight and capture/display only flags on line.
Absence of flags indicates inactive device.

OPERATING INSTRUCTIONS: Run Monitor (Line or Buffer)

1. Check Setup Menu for proper bit rate, clock sources, etc.

RESULTS:

Flags (hex 7E) are highlighted in buffer.

REVISION: (06-25-87) PROGRAM NAME: X_LINKUPDN

PROGRAM PURPOSE: Bring link up then down, beep and highlight errors.

OPERATING INSTRUCTIONS: Run Simulate

1. Test is DTE
2. Check Setup Menu for proper bit rate, clock sources, etc.

RESULTS:

Leads not up or improper response to SABM are highlighted.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

REVISION: (06-25-87) PROGRAM NAME: X_LVL1

PROGRAM PURPOSE: Detect control lead and interface problems.

OPERATING INSTRUCTIONS:

1. Connect analyzer to X.25 link that should be active
2. Run monitor program
3. DTE clock is expected to be supplied by the DCE, can be changed in SETUP menu.

RESULTS:

1. No beep indicates all needed leads high and presence of flags with clock on both sides of the line.

2. If DSR, CD, or CTS is not high (DCE leads) counter 1 is set to 1 and the analyzer beeps.
3. If DTR or RTS is not high (DTE leads) counter 1 is set to 2 and the analyzer beeps.
4. If no flags are present on the DCE side (pin 3) counter 2 is set to 1 and the analyzer beeps.
5. If no flags are present on the DTE side (pin 2) counter 2 is set to 2 and the analyzer beeps.
6. If flags are not present on either side check for clocks on POD on pins 15 and 17 or 24 if DTE supplies its own clock.

Counter 1 or 2 values of 1 indicate a modem problem.
Counter 1 or 2 values of 2 indicate a terminal problem.

Unlisted Counters and Timers may be used in the program, but their contents have no user meaning.

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Colorado Springs, Colorado 80933 U.S.A.

Manual Part Number 5959-2325
Printed in the U.S.A
September 1987

HEWLETT PACKARD